

Final Report of the External Review of the Prairie Swine Centre Inc. University of Saskatchewan

Respectfully submitted to:

Dr. James F. Basinger
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Review Team:

- Dr. Roger Campbell, CEO, Cooperative Research Centres (CRC) Australia, External Reviewer
- Dr. Harold Fast, pork producer and founder of Fast Genetics, Industry Reviewer
- Dr. Gord Zello, Professor of Nutrition, College of Pharmacy and Nutrition, University of Saskatchewan, Head of the Division of Nutrition and Dietetics, Internal Reviewer

Date:

Site Visit: July 19-20, 2012

Final Report: January 26th, 2013

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January 26, 2013

Dear Dr. Basinger:

Please find herein the final report of the University of Saskatchewan's Centres Review Team for Prairie Swine Centre (PSC) Inc. (www.prairieswine.ca) which is designated as a "C" Centre at the University. The composition of the review team was Dr. Roger Campbell, CEO, Cooperative Research Centres (CRC) Australia (porkcrc.com.au) as the external reviewer, Dr. Gord Zello, Professor of Nutrition in the College of Pharmacy and Nutrition, Head of the Division of Nutrition and Dietetics (www.usask.ca/pharmacy-nutrition) as the internal reviewer and Dr. Harold Fast, pork producer (founder of Fast Genetics, www.fastgenetics.com) and veterinarian representing the pork industry.

The Centres Review is part of a process originating from the Office of the Vice President Research at the University of Saskatchewan (U of S) to examine the value and effectiveness of PSC as a research, graduate training and technology transfer institution serving the Canadian pork industry. The on-site review took place July 19th and 20th, 2012 with a number of follow up meetings and discussions either in person or via electronic communication. In addition to the on-site inspection of the PSC, the review team met with both PSC staff and the appropriate stakeholder groups.

Some of the findings, thoughts and recommendations of the review team have been shared with both the University and PSC both verbally and draft written reports since July 2012. This Final Report, in the view of the review team, does not deviate from previous information that has been shared.

The review team would like to acknowledge Lee Whittington, President/CEO, Prairie Swine Centre Inc., for being a most generous host during our visit.

Our responses to the specific questions posed and recommendations follow:

1. Mandate

a. How well is the centre fulfilling its goals and objectives; in particular, is there alignment with the strategic directions of the University, as well as government and industry partners?

All with whom the review panel met were complimentary and appreciative of PSC's contributions to their needs, whether the provision of research animals, or parts thereof (e.g. effect of radiation on stem cells in testicles, to respiratory systems for CF research), university and industry research initiatives, and as swine producers. All people interviewed were complimentary of PSC leadership and managing their customer needs in a friendly predictable fashion. The review team found no exceptions to the above statements.

The University:

The PSC provides training of postgraduates and undergraduates for the U of S and works closely with all U of S groups interviewed to provide animals and access to facilities (i.e. farm and research) on an as needed basis, as well as collaborate on research initiatives. In addition to more formal arrangements with the PSC research scientists (e.g. roles in teaching and mentoring undergraduate and graduate students), the centre provides volunteer experiences to Western College of Veterinary Medicine (WCVM) students and to those wishing to apply to the WCVM. The PSC is the only place on campus (or near vicinity) at which students can experience and visualize swine production (i.e. no swine facilities are on campus). The centre is one of only few places available for U of S scientists interested to carry out swine research (i.e. both animal science and pig as a human model) near the campus. The importance of this has been magnified with the closing of the Research Annex (RUH) and the Animal Resource Centre of campus which were capable of handling smaller pigs for research, and the decision not to include housing and adequate research capabilities for pigs in the new Health Sciences Complex. The R&D program of the PSC is at best loosely aligned with those of the U of S but this is an area where, through better collaboration, the R&D programs and funding of both organizations can be enhanced. The centre's R&D priorities are however closely aligned with the industry as per the PSC Mandate.

Recommendation

That U of S and PSC researchers work more closely in the development of funding applications and in the conduct of research projects that are strategic for the Saskatchewan and national pork industries. Collaborative opportunities exist in animal welfare, engineering, grain and feed processing and utilization.

The Pork Industry:

At the industry level, the producers interviewed were satisfied the PSC conducts relevant R&D and provides valuable information to enhance their competitiveness and extends research information extremely effectively. The latter was the general feedback from all those the review team met with and was obvious from the feedback (based on surveys) from those who attended the various PSC producer and other industry meetings over the last two years.

Government:

At the government level PSC is seen as a major asset and those interviewed thought PSC's objectives and goals were very much in line with those of the provincial government (e.g. cost reduction/efficiency, welfare and environment). The government officials interviewed made the point that they have maintained their core funding of the centre (\$330K/annually) and continue to contribute funds at the project level. The PSC certainly meets its government mandate. The government officials interviewed were very complimentary of the role the PSC plays in meeting government objectives and with the quality of reports received from the PSC and thought that the U of S could better support the centre.

The PSC continues to set measureable objectives on which they report regularly as part of their tech transfer system. Their tech transfer system was often referred to as something the rest of the University should try to emulate. Volker Gerdts informed the review team that VIDO uses the PSC as one of their communication conduits to the production industry and swine conferences.

Internationally the PSC brand is held in high regard; they have good connections in Europe and are as well known throughout North America as in Canada.

As the U of S, government and industry's goals are to develop people, knowledge and market our agricultural products, the PSC is a major contributor to making these happen.

Recommendation

That the U of S provide greater funding support to the PSC to more closely match that from industry and government.

b. Are there research and scholarly opportunities available to the centre that it needs to consider?

We believe that opportunities exist for improved communication/collaboration with U of S research scientists. Communication and mutual respect among those within the College of Agriculture and Bioresources appears good. Examples of collaboration/interaction include: Denise Beaulieu's calcium/phosphorous research, the objective to have the pig as the first live animal used in the Canadian Light Source, John Harding's uterine

capacity studies related to fetal development and Andrew Van Kessel's work on gut microbiology. Several colleges use the PSC to introduce students to modern swine production; however there likely remain opportunities for others on campus to recognize their potential for using PSC for programs, from engineering to animal models. Opportunities for greater collaboration and some short-term achievable examples would include.

- i) Animal modeling: As the Pig is more applicable to humans (e.g. physiology more similar) than the mouse (e.g.) and as PSC personnel are familiar with trial work, this provides an opportunity for several departments, including the College of Medicine in their research programs.
- ii) As we need to continue to attract and develop young people in all disciplines, the pig is a unique animal that addresses issues ranging from grain use, to animal handling, to meat quality and processing.
- iii) PSC has always had good collaboration with customers beyond Saskatchewan, as other jurisdictions focus less on Agriculture and food safety the U of S has a unique opportunity to build on those earlier relationships.
- iv) The PSC has excellent facilities and technical support and opportunity exists for better/more collaboration between PSC scientists and those from the U of S to apply for joint funding of projects and maybe indicate that the centre has a better reputation in pig science than the university. In addition to the above (i – iii) collaborative opportunities exist in animal welfare, engineering, grain and feed processing and utilization – especially with the future involvement of U of S with a state of the art feed mill.

To achieve the above and engage in other opportunities the University and the PSC may need to explore a different funding model.

Recommendation

That the U of S consider the appropriateness of the current centre's financial model that the PSC operates under, however, great care would be need to maintain the nimbleness of PSC management model which is responsible for so many successes.

c. Are there business or entrepreneurial opportunities available to the centre that it needs to consider?

In principle, additional business and entrepreneurial opportunities always exist. Given the global reputation of the PSC and the strong marketing skills of Lee Whittington, and the status of being a Type C centre, suggests the PSC is well placed for rapid identification and able to pursue those opportunities. An example that was mentioned several times was the need to transition from conventional sow housing to something yet

to be defined. This is an important issue with the industry globally. PSC has a competitive advantage which should be exploited through applications for additional funding which would be markedly enhanced if Sandra Edwards could be attracted to the proposed NSERC Industrial Research Chair in Swine Welfare.

- i) Feed costs and feed utilization will remain constraints on the Canadian and global pork and animal industries. The PSC has excellent facilities for pursuing opportunities from grain processing to enhancing the utilization of fibrous ingredients and should look at collaborating with U of S researchers.
- ii) There may exist an opportunity to obtain core funding from the grain industry if the right R&D program can be established (between the centre and U of S). This would be the case if the U of S were to pursue a state of the art feed mill.
- iii) The PSC should investigate means of better exploiting its reputation and facilities to get more contract research projects.
- iv) Better collaboration between PSC and U of S researchers in the development of funding applications would seem a logical opportunity for the centre and the university. At present, much of the basic swine research (and teaching) beneficial to the U of S is performed by the adjunct research scientists at the PSC and not core U of S faculty. The importance of their contribution to the both the undergraduate and graduate curriculum was emphasized by the Department of Poultry and Animal Science. It was clearly stated that “swine” is essential in the curriculum as the pig is one of a few monogastric farm animals.
- v) A concern is the small number of swine research leaders at the U of S (one faculty designated as “swine” but not currently involved in research to any great extent) and at the PSC (3 Research Scientists in 3 different swine research disciplines). Therefore, if one of the PSC scientists were to leave, the short term sustainability of PSC would be seriously compromised. Consideration should be given to make salaries at the PSC more competitive (and in line of U of S faculty) – perhaps by creation of U of S faculty positions? Again, a change in the centre model maybe required. Individually, all 3 research scientists are very good at attracting R&D funds (including tri-council grants) and need to be retained. They are also heavily involved in the training of highly qualified personnel (HQP) and teaching of students. The numbers of scientific publications (etc) are comparable to those expected by university faculty (and exceed in some outcome measures).

Recommendations

1. That U of S and PSC appoint a chair in animal welfare and aim to become the preeminent researchers in the field

2. That consideration is given to offering PSC researchers similar salary packages and employment conditions as those at the U of S and better integrate PSC teaching of especially grad students with the faculties on campus.

d. Are the quantity and quality of the Centre's community and industry outreach and engagement activities reasonable?

- i) The PSC strategic plan is very clear at defining minimum measurable annual achievements, including number of referred papers and participation in industry conferences. The ethology program is recognized globally and even with Harold Gonyou's retirement, continues to attract attention and develop innovative approaches to enhancing animal welfare. For example, centre researchers are investigating the delivery of piglet analgesics via the sow's milk. The industry and government has considerable interest in the housing and management of pregnant and lactating sows. The ethology group is also working with industry and within commercial swine farms on the management of group housed gestating sows.
- ii) The centre's extension and communication programs are acknowledged (by all those interviewed) as world class and valued by industry and government.
- iii) The PSC has graduated 48 post-graduate students who are now working globally. Several former PSC staff are now integral parts of swine programs in Alberta and Ontario.
- iv) The tech transfer program is and continues to be a gold standard that adapts with times and technology. For example there was a time when PSC would televise producer information programs into local school class rooms that had the capability of receiving electronic signals. That has evolved to webinars and Lee Whittington is currently in negotiations with Alberta to assume leadership and marketing of the Western Hog Journal. When successful this will be a good example of a New West partnership effort and will possibly evolve to be a national publication.

Does the Centre add value to research and training through enhancing scientists/managers pursuit of external support and their development of highly qualified students that can serve academia, government and industry?

The senior personnel bring in significant research funds. Funding secured in 2010-2012 was reviewed in detail, but for confidentiality reasons this information is not repeated within the body of this report. The amounts are considerable and reflect the innovativeness and scientific expertise and reputations of the researchers involved. Other areas that the committee determined added value and enhanced external support include:

- i) As recently as last month, the PSC surveyed industry needs and priorities. This information has to be of interest to Government and University leaders. It also showed the PSC remains the industry choice as a knowledge source.
- ii) PSC has trained 48 graduate students including those currently enrolled; composed of 11 PhD and 37 MSc. Of these 27 individuals are currently involved in North American agriculture in either industry or research, an additional 3 hold positions internationally.
- iii) In addition to graduate students, technicians and production employees trained at the Centre are engaged in pork production throughout the region. Additional training of vet technician, undergraduate students, and volunteers seeking practical training for veterinary school application is also provided.
- iv) Several aspiring pre-vet students spend time at the Centre adding practical animal production time to their resume before applying for acceptance to the Vet College. Some of these students continue their interest in pigs after earning their degree.
- v) The PSC is an excellent research and training facility and is a real asset to the industry, government and the U of S. It should not be undervalued and should be better supported by the university.

Are the Centre and its activities known, and does it have meaningful impact?

a. In the field of Animal Production Science?

The PSC is known and acknowledged internationally and in the field of Animal Production Science is probably the most recognized of the Canadian research institutions for its scientific and commercial related publications.

Based on interviews the impact of the research at the industry and government levels is impressive and valued.

- i) The centre's research on sow housing and animal welfare in general is recognized as world leading as is Dr. Harold Gonyou.
- ii) The centre's research on nutrition is also recognized globally and Dr. Denise Beaulieu is commonly invited to present on her research and its implications at international meetings (e.g. recent ASAS meeting in Phoenix and at the upcoming Leman conference in Minnesota). Of note, Dr. Beaulieu's recent findings suggesting that carbohydrates have a markedly bigger effect on protein deposition than lipid (at the same energy intake) has tremendous implications if proven correct – this research is extremely challenging and innovative.
- iii) The centre's research in engineering is/was also very impressive and at a much higher technical level than the reviewers initially imagined.
- iv) The engineering section at the centre has had excellent outcomes associated with reducing power costs and handling effluent. There would seem to be further opportunities for strategic research in the design of group housing facilities/pens for gestating sows. This is a likely funding opportunity.

Recommendation

That a more engaged discussion of research opportunities with the College of Engineering should take place.

b. At the University?

Everyone we met on campus was very complimentary with PSC's contribution to their needs, whether it was as a source of animals for testing to a place to introduce students to modern production and animal handling. The point was made several times, PSC staff are used to doing research work, suggesting the end results can be expected to be repeatable (e.g. quality is not questioned).

c. At other institutions?

The PSC has a long list of collaborators, globally as well as nationally. Some of the collaborations entered into over the last 3 years are listed below:

Lee Whittington

1. Dr. A. Mussel, George Morris Centre (Ontario)
2. Dr. F. Pouliot, CDPQ (Quebec)
3. Dr. J. Agnew, PAMI (Saskatchewan)
4. P. Faladreau, CDPQ (Quebec)
5. Dr. H. Gauvreau, Warman Veterinary Clinic (Saskatchewan)
6. Dr. B. Jones, Southwest Ontario Veterinary Services (Ontario)
7. Dr. S. Messier, Demeter Service Veterinaires (Quebec)
8. A. Chambers, JSR Genetics (United Kingdom)

Dr. Bernardo Predicala

1. Dr. M. Nemati, University of Saskatchewan
2. Dr. J. Agnew, PAMI (Saskatchewan)
3. R. Macdonald, AMEC (Ontario)
4. F. Kains (Ontario)
5. H. Huffman (Ontario)
6. F. Pouliot, CDPQ (Quebec)
7. Dr. S. Lemay, IRDA (Quebec)
8. Dr. J. Feddes
9. Dr. R. Hogue
10. Dr. C. Duchaine
11. N. Turgeon, Coop Federee (Quebec)
12. Dr. H. Gauvreau (Saskatchewan)
13. Dr. B. Jones (Ontario)
14. Dr. S. Messier, Demeter Services Veterinaire (Quebec)
15. A. Chambers, JSR Genetics (United Kingdom)
16. Dr. D. Korber, University of Saskatchewan
17. Dr. R. Maghirang, Kansas State University
18. Dr. I. Indratmo, Grant MacEwan University
19. Dr. D. Erl, Safety Services (Manitoba)

Dr. Jennifer Brown

1. Dr. N. Cook, Alberta Agriculture.
2. Dr. C. Bench, University of Alberta.
3. Dr. T. Crowe, University of Saskatchewan.
4. Dr. L. Connor, University of Manitoba.
5. Dr. T. Widowski, University of Guelph.
6. Dr. R. Bergeron, University of Guelph.

7. Dr. L. Faucitano, Agriculture and Agri-Food Canada, Lennoxville.
8. Dr. N. Devilliers, Agriculture and Sgri-Food Canada, Lennoxville.
9. Dr. J. Connor, Carthage Vet Clinic (Illinois, USA)
10. Dr. L. Greiner, Carthage Vet Clinic (Illinois, USA)

Dr. Denise Beaulieu

1. Dr. J. Patience, Iowa State University
2. Dr. P. Leterme, Cargill Nutrition (Europe)
3. Dr. R. Zijlstra, University of Manitoba
4. Dr. T. Scott, University of Saskatchewan
5. Dr. M. Nyachoti, University of Manitoba
6. Dr. P. Shand, University of Saskatchewan
7. Dr. S. Kontulainen, University of Saskatchewan
8. Dr. K. de Lange, University of Guelph
9. Dr. L. Connor, University of Manitoba
10. Dr. E. Beltranena, Alberta Agriculture
11. Dr. M. Young, Gowans Feed Consulting
12. Dr. A. Van Kessel, University of Saskatchewan
13. Dr. J. Harding, University of Saskatchewan
14. Dr. H. Stein, University of Illinois
15. Dr. P. Uriola, Cargill Animal Nutrition (Minnesota)

d. The various stakeholders and communities it serves?

The above comments have several references of PSC value to the University, producers and Government interests; however, we have not addressed value to the grains sector. We were told that 38% of our grain is fed to livestock. Some grain is grown specifically for feed; however often grain and oil seed is not eligible for the human market. Pigs make an ideal value added alternative. While the grains & oil seed market is strong today that certainly has not been consistent. The excessive price discount on light bushel weights was early work at the PSC and proved that bushel weight was not a true reflection of feed value. This clearly had financial value for the grains industry. Similarly we often have off grade canola be it frozen or high green content; again the work on whole seed Canola is directly applicable and “on the shelf” for our next compromised crop.

Sid Friesen, SAF, mentioned the contribution PSC feed specs had with Canadian trade talks.

Recommendation

That the PSC seek core funding from the grain industry; perhaps a chair position focusing on feeding opportunities, especially as the world considers higher fibre feeds for monogastrics.

2. Infrastructure

a. Does the centre have the right mix of scientists, staff and stakeholders?

- i) The review team would like to compliment PSC staff for their enthusiasm and attention to detail. Our industry has been through several tough years and staff is very aware of their precarious position, yet the barns were neat, maintenance standards did not appear to have suffered and staff attitude continues to be very positive. This translates into some very impressive production numbers. For example, the last 16 weeks they were weaning 29.6 pigs per sow per year. That is an impressive accomplishment even in a commercial herd. That fact that staff achieved this while running a daughter nucleus herd and accommodating research needs is a remarkable testament to team work and planning detail. Indeed, the teamwork at the centre was exceptional. The high performance of the herd also contributes to PSC credibility when scientists are presenting results in print or at conferences. This is a well producing herd and as such, research results do have meaning.
- ii) The PSC is thin on research staff, while the scientists there are very productive and attract excellent research funds they run the risk if one leaves, for whatever reason; PSC's future becomes even more precarious.
- iii) The atmosphere at the PSC is quite positive so likely there remains good upside potential to increase training output, whether for industry or for U of S student needs.
- iv) Based on what was learned during the review process and taking into account opportunities and challenges for the Canadian swine industry the review team is of the view that the PSC has the right mix of researchers, staff and stakeholders.

b) Is the centre effectively and efficiently utilizing its resources?

- i) We would think with the skeleton staff on hand that there is significant research potential that is being missed or facilities that might be underutilized. While VIDO is a strong supporter they are usually working with infectious organisms so cannot use animals on PSC site. Likely other researchers on campus could be more involved. For example when we visited via telephone with provincial representatives it was suggested more ADF funding was available, particularly for engineering and sow housing/welfare projects.

- ii) Both the graduate students at the PSC and Dr. Denise Beaulieu suggested more interaction with campus would be a good thing. This might be an opportunity where more pig related graduate students use some of the available facilities on the PSC site. That might free up space on campus, further involve campus researchers and enhance cross fertilization of ideas.
- iii) The University is becoming involved with a state of the art feed mill and the PSC is the only large user (field scale model) of mono gastric nutrition. This would seem an ideal opportunity for the centre and the U of S to develop collaborative R&D proposals and projects that will benefit both organizations and the Canadian pork and feed industries.

Recommendation

That the PSC seek additional contract funding and ensure facilities are utilized to maximum impact and efficiency

c) Is the Centre sustainable?

- i) Probably not in its present form as core funding has been eroding. This is especially damaging when market returns have been so negative. If a senior staff person were to leave it is doubtful if the reduced income could be handled. Similarly another cash crunch, like present feed prices, would be very difficult to handle. All those interviewed thought the U of S could/should contribute more funding including in-kind support to the centre. This was particularly the view of industry and government. Further funding from the pork industry and possibly the grain industry should also be investigated.
- ii) The staff is in place, the herd is performing well, PSC reputation is remarkably high and they have excellent research facilities. Thus, in short the ingredients are there for continued success. Missing is greater depth which more senior research leaders and graduate students would bring. However, building on such opportunities would require a change in base support or a new administrative structure. Again we caution any change in administrative structure must not remove management's ability to capitalize on opportunities.
- iii) The centre requires greater and more certain financial support. The latter could be achieved through better collaboration between centre researchers and those from the U of S in the development of joint funding applications especially in the areas of animal welfare, nutrition and feed processing/utilization and engineering, the establishment of a chair in animal welfare (more funding), more contract research and an increase in core

funding from the pork industry, the U of S and potentially from the grain industry.

- iv) The PSC is an excellent research facility and an asset to the province, Canadian agriculture, animal science and the University, but the funding model should be revisited (i.e. “What worked 20 years ago – that is a Centre C – might not work now”).

3. Long term Vision

a) Is the Centre’s vision a reflection of stakeholders’ needs?

- i) For the most part yes, as their strategic plan is current and focused. The PSC has always been very connected and strategic with its board membership, and similarly, the tech transfer system has been driven by being interactive and innovative.
- ii) The centre’s vision is certainly in line with that of the pork industry and the government.
- iii) As stakeholder needs change we expect PSC management will either lead that change or make needed adjustments.

b) Are there strategic research opportunities available that should influence the Centre’s evolution?

- i) The discussion regarding the welfare chair was interesting and if a person of Sandra Edwards caliber can be placed in that role that would be quite useful and enable the University and the centre to maintain its world leading position in animal welfare and attract funds accordingly. Animal welfare and sow housing in particular is and will remain a major industry/government issue and a genuine strategic opportunity.
- ii) Increasing the efficiency with which grains and more fibrous ingredients are utilized is also a strategic research opportunity and the eminent involvement of the University with a feed mill provides an unparalleled opportunity for the University and centre to develop innovative R&D programs and funding applications – the centre is ideal for this type of research to be conducted.
- iii) We expect an engineering proposal especially regarding gestation stalls would be well received with ADF funding. The engineering section at the centre has had excellent outcomes associated with reducing power costs and handling effluent. There would seem to be further opportunities for strategic

research in these areas and as mentioned above in the design of group housing facilities/pens for gestating sows.

- iv) Some discussion was held on the development of a miniature pig herd and/or specialist facilities to house transgenic pigs. The review team however is not sure the centre is set up for these activities and detailed business plans would need to be developed before making such decisions.
- v) We wonder, with the importance of grains and oil seeds in Western Canada, would there be interest in an endowed chair focusing on feeding opportunities in regards to monogastrics or for that matter livestock generally?

Recommendation

That a more engaged discussion of research opportunities with the College of Engineering should take place (repeated recommendation).